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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,708	12/08/2003	Alex Nugent	1000-1214	3983

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EXAMINER	
COUGHLAN, PETER D	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/730,708	NUGENT, ALEX
	Examiner	**Art Unit**
	Peter Coughlan	2129

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,6,7,9-20 and 23-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6,7,9-20 and 23-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/8/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. This office action is in response to an AMENDMENT entered February 15, 2007 for the patent application 10/730708 filed on December 8, 2003.

2. All previous office actions are fully incorporated into this Final Office Action by reference.

Status of Claims

3. Claims 1-3, 6, 7, 9-20, 23-27 are pending.

Claim Rejections - 35 USC § 112

4. Claims 1, 6, 9, 13, and 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. These claims state the invention is

based in a electromechanical method. The term 'electromechanical' is not mentioned at all within the specification.

These claims must be amended or withdrawn from consideration.

Claims 1, 6, 9, 13, 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. These claims use the words or 'solution' and 'mixture'. Below is Webster's Collegiate Dictionary of these two words.

Mixture--a portion of matter that consisting two or more components in varying proportions that retain their own properties.

Solution--an act or the process by which a solid, liquid or gaseous substance is homogeneously mixed with a liquid or sometimes a gas or a solid.

Applicant uses these two words within the same sentence but by the definitions, that are opposite of each other. For example in claim 1, '...said dielectric liquid solutions comprises a mixture of...', makes no sense. It is either a 'solution' or a 'mixture.'

These claims must be amended or withdrawn from consideration.

Claims 11, 12, 18, 19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter

which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This claim states the ability of 'automatically summing' input signals without describing the hardware needed to execute this function. In addition, this claim also states the ability to compare the 'summed' input signal and compare it to a 'threshold' value or 'excitation level' and emitting a refractory pulse if the current activation exceeds the threshold value.

Claim 2 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. It is not stated within the specification the diagram of at least neuron, which behaves as a 'refractory pulse generator', that provides a feedback signal.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 2 recites the limitation "said neuron" as an independent claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3, 9, 10, 13-17, 20, 23, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHardy et al in view of Nagahara, and further in view of Kaler. (U. S. Patent 5315162, referred to as **McHardy**; 'Directed placement of suspended carbon nanotubes', referred to as **Nagahara;** U. S. Patent Publication 20030048619, referred to as **Kaler**)

Claim 1

McHardy teaches providing an artificial physical neural network (**McHardy,** abstract) comprising at least one neuron and at least one synapse thereof. (**McHardy,** abstract; 'Neuron' of applicant is equivalent to 'metallic whisker' of McHardy. 'Synapse' of applicant is equivalent to 'synapse' of McHardy.)

McHardy does not teach wherein said at least one synapse is provided by a plurality of nanoconnections formed from a plurality of nanoconductors disposed and free to move about within a dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode thereof and an electric field applied thereof, wherein said dielectric solution comprises a mixture of a dielectric solvent and said plurality of nanoconductors.

Nagahara teaches wherein said at least one synapse is provided by a plurality of nanoconnections formed from a plurality of nanoconductors (**Nagahara,** abstract; 'Nanoconductors' of applicant is equivalent to 'nanotubes' of Nagahara.) disposed and free to move about within a dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode (**Nagahara,** abstract, p3827, C2:9-22; 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara.) thereof and an electric field applied thereof, wherein said dielectric solution comprises a mixture of a dielectric solvent and said plurality of nanoconductors. (**Nagahara,** abstract; 'Electric field applied' of applicant is equivalent to 'ac bias is applied' of Nagahara.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of McHardy by using nanoparticles for connection between electrodes as taught by Nagahara to have at least one synapse is provided by a plurality of nanoconnections formed from a plurality of nanoconductors disposed and free to move about within a dielectric liquid solution in association with at least one pre-

synaptic electrode and at least one post-synaptic electrode thereof and an electric field applied thereof, wherein said dielectric solution comprises a mixture of a dielectric solvent and said plurality of nanoconductors.

For the purpose of generating connections between electrodes as needed. McHardy and Nagahara do not teach locating said dielectric liquid solution within a connection gap formed between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said at least one synapse of said artificial physical neural network becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said artificial physical neural network are strengthened; and transmitting at least one pulse generated from said at least one neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one synapse thereof.

Kaler teaches locating said dielectric liquid solution within a connection gap formed between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said at least one synapse of said artificial physical neural network becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said artificial physical neural network are strengthened (**Kaler,** abstract; 'Nanoconnections is strengthened or weakened according to an application of said electric field' of applicant is equivalent to 'conductance and their thickness, conductivity, and fractal dimension can be controlled by varying the frequency and voltage of the applied field' of Kaler.); and transmitting at least one pulse generated from said at least one neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one synapse thereof. (**Kaler,** abstract; 'Transmitting at least one pulse' of applicant is equivalent to 'alternating current' of Kaler. If the 'pulse' is greater

than previous pulses the nanoconnection will be strengthen.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by being able to increase or decrease the conductivity as taught by Kaler to locating said dielectric liquid solution within a connection gap formed between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said at least one synapse of said artificial physical neural network becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said artificial physical neural network are strengthened; and transmitting at least one pulse generated from said at least one neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one synapse thereof.

For the purpose employing electrical fields to generate connections and conductivity between electrodes and using these selectable and adjustable properties to construct a neural network.

Claim 3

McHardy teaches forming a connection network within said connection gap from said plurality of nanoconnections by applying said electric field across said connection gap to said at least one pre-synaptic electrode and said at least one post-synaptic electrode associated with said plurality of nanoconnections. (**McHardy,** C6:67 through C7:5; 'Connection network' of applicant is equivalent to 'neural networks having many synaptic junctions' of McHardy.)

Claim 9

McHardy teaches configuring an adaptive artificial physical neural network (**McHardy,** abstract, C4:55-68; 'Adaptive' of applicant means 'which can be formed from a plurality of interconnected nanoconnections or nanoconnectors' is equivalent to 'growth of CAF' and 'redissolves the CAF' of McHardy.) to comprise a connection network (**McHardy,** abstract; 'Connection network' of applicant is equivalent to 'neural network' of McHardy.)

McHardy does not teach comprising a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors, said plurality of nanoconductors located and free to move about within

said a dielectric liquid solution, wherein said plurality of nanoconductors experiences an alignment with respect to an applied electric field to form said a connection network thereof, such that said adaptive physical neural network comprises a plurality of neurons interconnected by said a plurality of nanoconnections.

Nagahara teaches comprising a plurality of nanoconnections (**Nagahara,** abstract; 'Nanoconnections' of applicant is accomplished by 'nanotubes' of Nagahara.) formed from a dielectric liquid solution(**Nagahara,** p3827, C2:9-22; 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara.) comprising a mixture of a dielectric solvent and a plurality of nanoconductors, said plurality of nanoconductors located and free to move about within said a dielectric liquid solution, wherein said plurality of nanoconductors experiences an alignment with respect to an applied electric field to form said a connection network thereof, such that said adaptive physical neural network comprises a plurality of neurons interconnected by said a plurality of nanoconnections. (**Nagahara,** abstract, p3827, C2:9-22; 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara. 'Applied electrical field' of applicant is equivalent to 'ac bias is applied' of Nagahara.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of McHardy by using nanoparticles for connections between electrodes as taught by Nagahara to have a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors, said

plurality of nanoconductors located and free to move about within said a dielectric liquid solution, wherein said plurality of nanoconductors experiences an alignment with respect to an applied electric field to form said a connection network thereof, such that said adaptive physical neural network comprises a plurality of neurons interconnected by said a plurality of nanoconnections.

For the purpose of generating connections between electrodes only when needed or required.

McHardy and Nagahara do not teach locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened; providing an increased frequency of said applied electric field to strengthen said plurality of nanoconnections within said adaptive physical neural network regardless of a network topology thereof.

Kaler teaches locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened; providing an increased frequency of said applied electric field to strengthen said plurality of nanoconnections within said adaptive physical neural network regardless of a network topology thereof. (**Kaler,** abstract; 'Nanoconnections is strengthened or weakened according to an application of said electric field' of applicant is equivalent to 'conductance and their thickness, conductivity, and fractal dimension can be controlled by varying the frequency and voltage of the applied field' of Kaler.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by being able to adjust the thickness of the connections between the electrodes as taught by Kaler to have locating said dielectric

liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened; providing an increased frequency of said applied electric field to strengthen said plurality of nanoconnections within said adaptive physical neural network regardless of a network topology thereof.

For the purpose of selectivity forming (pruning) a neural network.

Claim 10

McHardy teaches providing at least one output from at least one neuron of said plurality of neurons to an input of another neuron of said adaptive physical neural network. (**McHardy,** abstract, C4:55-68; 'Adaptive' of applicant means 'which can be formed from a plurality of interconnected nanoconnections or nanoconnectors' is

equivalent to 'growth of CAF' and 'redissolves the CAF' of McHardy. 'Output' of applicant is equivalent to 'output' of McHardy.)

Claim 13

McHardy teaches providing an artificial a physical neural network (**McHardy,** abstract) comprising a plurality of neurons connected via a connection network (**McHardy,** abstract; 'Connection network' of applicant is equivalent to 'neural network' of McHardy. 'Neuron' of applicant is equivalent to 'metallic whiskers' of McHardy.)

McHardy does not teach a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of plurality of nanoconductors and a dielectric solvent, wherein said plurality of nanoconductors is disposed and free to move about within said a dielectric liquid solution to form said connection network wherein said plurality of nanoconnections transfers signals.

Nagahara teaches a plurality of nanoconnections (**Nagahara,** abstract; 'Nanoconnections' of applicant is accomplished by 'nanotubes' of Nagahara.) formed from a dielectric liquid solution (**Nagahara,** abstract, p3827, C2:9-22; 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara.) comprising a mixture of plurality of nanoconductors and a dielectric solvent, wherein said plurality of nanoconductors is disposed and free to move about within said a dielectric liquid solution to form said connection network wherein said plurality of nanoconnections transfers signals. (**Nagahara,** abstract,

p3827, C2:9-22; 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara. 'Applied electrical field' of applicant is equivalent to 'ac bias is applied' of Nagahara. 'nanoconnections transfers signals' of applicant is accomplished by 'nanoscale wiring' of Nagahara.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of McHardy by illustrating how nanoconductors are made into a connective link between electrodes as taught by Nagahara to have a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of plurality of nanoconductors and a dielectric solvent, wherein said plurality of nanoconductors is disposed and free to move about within said a dielectric liquid solution to form said connection network wherein said plurality of nanoconnections transfers signals.

For the purpose of having a basis for a physical neural network.

McHardy and Nagahara do not teach locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein

nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened.

Kaler teaches locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened. (**Kaler,** abstract; 'Nanoconnections is strengthened or weakened according to an application of said electric field' of applicant is equivalent to 'conductance and their thickness, conductivity, and fractal dimension can be controlled by varying the frequency and voltage of the applied field' of Kaler.) It would have been obvious to a person having ordinary skill in the art at the time of

applicant's invention to modify the combined teachings of McHardy and Nagahara by being able to control the thickness of the connection between the electrodes as taught by Kaler to have locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said adaptive artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened.

For the purpose of having a adaptive physical neural network that is trainable and flexible.

McHardy teaches presenting an input data set to said artificial physical neural network to produce at least one output thereof (**McHardy,** abstract, C1:29-45; 'Input data' of applicant is illustrated by having 'trainability' of McHardy. The training data would be inputted at the 'input terminals' of McHardy.); and increasing network activity within said artificial physical neural network until said at least one output changes to a

desired output. (**McHardy,** C2:55-65; 'Increasing network activity' of applicant is equivalent to 'increasing...chemical reaction' of McHardy.)

Claim 14

McHardy and Nagahara do not teach increasing a number of firing neurons in said artificial, physical neural network.

Kaler teaches increasing a number of firing neurons in said artificial, physical neural network. (**Kaler,** abstract; 'Increasing the number of firings' of applicant is controlled by the conductivity, thickness and fractal dimensions of the microwires, which is controlled by frequency and voltage applied to the field.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by being able to vary the neurons within the neural network as taught by Kaler to increase a number of firing neurons in said artificial, physical neural network.

For the purpose of the neural network to have the ability to adjust depending on various input and output requirements for a given situation.

Claim 15

McHardy teaches said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by said nanoconnections among said plurality of nanoconnections, each of said nanoconnections among said plurality of nanoconnections being associated with a weight (**McHardy,** C1:7-11;

'Plurality of neurons' and 'interconnected neurons of applicant is equivalent to 'neural network' of McHardy. 'Associated with a weight' of applicant is equivalent to 'adjustable weights' of McHardy.); and said increasing said network activity within said physical neural network includes scaling a weight associated with said nanoconnections by a positive factor. (**McHardy,** C2:55-65; 'Positive factor' of applicant is equivalent to 'increasing' of McHardy.)

Claim 16

McHardy and Nagahara do not teach said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by nanoconnections among said plurality of nanoconnections for transferring signals having a magnitude in a firing state; and said increasing said network activity within said artificial physical neural network includes increasing said magnitude of said signal in said firing state.

Kaler teaches said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by nanoconnections among said plurality of nanoconnections for transferring signals having a magnitude in a firing state (**Kaler,** abstract; 'Plurality of neurons' of applicant is equivalent to 'bioarray' of Kaler.); and said increasing said network activity within said artificial physical neural network includes increasing said magnitude of said signal in said firing state. (**Kaler,** abstract; 'Increasing said network activity' of applicant is controlled by the conductivity, thickness and fractal dimensions of the microwires; which is controlled

by frequency and voltage applied to the field.) .) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by having a neural network design and the ability is alter its input as taught by Kaler to have a plurality of neurons comprises a plurality of interconnected neurons that are interconnected by nanoconnections among said plurality of nanoconnections for transferring signals having a magnitude in a firing state; and said increasing said network activity within said artificial physical neural network includes increasing said magnitude of said signal in said firing state.

For the purpose of being able to employ the neural network for various problems.

Claim 17

McHardy and Nagahara do not teach said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by a plurality of data input neurons thereof adapted to receive respective external signals; said increasing said network activity within said artificial physical neural network includes increasing a magnitude of said respective external signals.

Kaler teaches said plurality of neurons comprises a plurality of interconnected neurons that are interconnected by a plurality of data input neurons thereof adapted to receive respective external signals (**Kaler,** abstract; 'Plurality of neurons' of applicant is equivalent to 'bioarray' of Kaler.); said increasing said network activity

within said artificial physical neural network includes increasing a magnitude of said respective external signals. (**Kaler,** abstract; 'Increasing said network activity' of applicant is controlled by the conductivity, thickness and fractal dimensions of the microwires, which is controlled by frequency and voltage applied to the field.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by having a neural network design and the ability is alter its input as taught by Kaler by having plurality of neurons comprises a plurality of interconnected neurons that are interconnected by a plurality of data input neurons thereof adapted to receive respective external signals; said increasing said network activity within said artificial physical neural network includes increasing a magnitude of said respective external signals.

For the purpose of being able to employ the neural network for various problems

Claim 20

McHardy teaches increasing said network activity within said artificial physical neural network in response to a signal. (**McHardy,** C2:55-65; 'Increasing network activity' of applicant is equivalent to 'increasing...chemical reaction' of McHardy.)

Claim 23

McHardy does not teach a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors; at least one neuron and at least one electromechanical synapse thereof, wherein said at least one electromechanical

synapse is configured from a plurality of nanoconnections formed from a plurality of nanoconductors disposed and free to move about within said dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode thereof and an electric field applied thereof; a connection gap formed between said between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein said liquid dielectric solution is located within said connection gap.

Nagahara teaches a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors (**Nagahara,** abstract, , p3827, C2:9-22;; 'Nanoconductors' of applicant is equivalent to 'nanotubes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara.); at least one neuron and at least one electromechanical synapse thereof, wherein said at least one electromechanical synapse is configured from a plurality of nanoconnections formed from a plurality of nanoconductors disposed and free to move about within said dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode thereof and an electric field applied thereof(**Nagahara,** abstract, p3827, C2:9-22; 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara. 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Electric field applied' of applicant is equivalent to 'ac bias is applied' of Nagahara. 'Neuron' of applicant is equivalent to

'nanoscale wiring' of Nagahara.); a connection gap formed between said between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein said liquid dielectric solution is located within said connection gap. (**Nagahara,** abstract, p3827, C2:9-22; 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of McHardy by introducing components needed for the physical neural network and how they work as taught by Nagahara to have a dielectric liquid solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors; at least one neuron and at least one electromechanical synapse thereof, wherein said at least one electromechanical synapse is configured from a plurality of nanoconnections formed from a plurality of nanoconductors disposed and free to move about within said dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode thereof and an electric field applied thereof; a connection gap formed between said between said at least one pre-synaptic electrode and said at least one post-synaptic electrode, wherein said liquid dielectric solution is located within said connection gap.

For the purpose of establishing a base from which to construct a neural network.

McHardy and Nagahara do not teach wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said

electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger.

Kaler teaches wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger (**Kaler,** abstract; 'Nanoconnections is strengthened or weakened according to an application of said electric field' of applicant is equivalent to 'conductance and their thickness, conductivity, and fractal dimension can be controlled by varying the frequency and voltage of the applied field' of Kaler.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by being able to alter the thickness of the connections as taught by Kaler to have each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger.

For the purpose of being able to alter the connections of the neural network so it can be adaptive

McHardy teaches adaptive artificial physical neural network(**McHardy,** abstract, C4:55-68; 'Adaptive' of applicant means 'which can be formed from a plurality of

interconnected nanoconnections or nanoconnectors' is equivalent to 'growth of CAF' and 'redissolves the CAF' of McHardy.)

McHardy and Nagahara do not teach thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened and pulse generation means for generating at least one pulse from said at least one neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening at least one nanoconnection among said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one electromechanical synapse thereof.

Kaler teaches thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened (**Kaler,** abstract; 'Utilized more' of applicant would indicate an increase of voltage or frequency thus strengthening the connection. 'Not utilized' of applicant would indicate a decrease of voltage or frequency thus dissolving back the connection.) and pulse generation means for generating at least one pulse from said at least one

neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening at least one nanoconnection among said plurality of nanoconnections disposed within said dielectric liquid solution and strengthening said at least one electromechanical synapse thereof. (**Kaler,** abstract; 'Nanoconnections is strengthened or weakened according to an application of said electric field' of applicant is equivalent to 'conductance and their thickness, conductivity, and fractal dimension can be controlled by varying the frequency and voltage of the applied field' of Kaler. Therefore if a neuron is used the electrical field would increase thus improving the conductance and thickness.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by having the ability to alter the conductivity of the connections as taught by Kaler to have nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said adaptive artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said adaptive artificial physical neural network are strengthened and pulse generation means for generating at least one pulse from said at least one neuron to said at least one post-synaptic electrode of said at least one neuron and said at least one pre-synaptic electrode of said at least one neuron of said physical neural network, thereby strengthening at least one nanoconnection among said plurality of

nanoconnections disposed within said dielectric liquid solution and strengthening said at least one electromechanical synapse thereof.

For the purpose of having a trainable and adaptive neural network.

Claim 24

McHardy teaches a connection network formed from said plurality of nanoconnections by applying said electric field to said at least one pre-synaptic electrode and said at least one post-synaptic electrode associated with said plurality of nanoconnections. (**McHardy,** C6:67 through C7:5, C4:21-30; 'Connection network' of applicant is equivalent to 'neural networks having many synaptic junctions' of McHardy. In this art the nanoconnections are the connections between the copper ions)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 7, 25, 26, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McHardy, Nagahara, and Kaler in view of Anderson. (U. S. Patent 4041953, referred to as **Anderson**)

Claim 6

McHardy teaches providing an artificial a physical neural network (**McHardy,** abstract) comprising a plurality of neurons (**McHardy,** abstract; 'Neuron' of applicant is equivalent to 'metallic whisker' of McHardy.)

McHardy does not teach formed from a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of a dielectric solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors, said plurality of nanoconductors disposed and free to move about within said a dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode.

Nagahara teaches formed from a plurality of nanoconnections (**Nagahara,** abstract; 'Nanoconnections' of applicant is accomplished by 'nanotubes' of Nagahara.) formed from a dielectric liquid solution comprising a mixture of a dielectric solution comprising a mixture of a dielectric solvent (**Nagahara,** p3827, C2:9-22; 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara.) and a plurality of nanoconductors, said plurality of nanoconductors disposed and free to move about within said a dielectric liquid solution in association with at least one pre-synaptic electrode and at least one

post-synaptic electrode. (**Nagahara,** abstract, p3827, C2:9-22; 'One pre-synaptic electrode' and 'one post-synaptic electrode' of applicant is equivalent to 'electrodes' of Nagahara. 'Dielectric solution' of applicant is equivalent to 'dielectric constant of the solution medium' of Nagahara.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the teachings of McHardy by introducing the formation of connections between electrodes by nanoconnections as taught by Nagahara to have a plurality of nanoconnections formed from a dielectric liquid solution comprising a mixture of a dielectric solution comprising a mixture of a dielectric solvent and a plurality of nanoconductors, said plurality of nanoconductors disposed and free to move about within said a dielectric liquid solution in association with at least one pre-synaptic electrode and at least one post-synaptic electrode.

For the purpose of establishing a basis for a physical neural network.

McHardy and Nagahara do not teach locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more said plurality of nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections

that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said artificial physical neural network are strengthened.

Kaler teaches locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more said plurality of nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said artificial physical neural network are strengthened. (**Kaler,** abstract; 'Nanoconnections is strengthened or weakened according to an application of said electric field' of applicant is equivalent to 'conductance and their thickness, conductivity, and fractal dimension can be controlled by varying the frequency and voltage of the applied field' of Kaler.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by

being able to alter the conductivity of the connections as taught by Kaler to have locating said dielectric liquid solution within a connection gap formed between at least one pre-synaptic electrode and at least one post-synaptic electrode of said artificial physical neural network, wherein each nanoconnection among said plurality of nanoconnections is strengthened or weakened according to an application of said electric field, such that the greater an electrical frequency or an amplitude of said electric field, the more said plurality of nanoconductors among said plurality of nanoconductors align to form said plurality of nanoconnections and the stronger said artificial physical neural network thereof becomes, and wherein nanoconnections among said plurality of nanoconnections that are not strengthened and thus not utilized by said artificial physical neural network are dissolved back into said dielectric liquid solution and nanoconnections among said plurality of nanoconnections that are utilized more frequently by said artificial physical neural network are strengthened.

For the purpose of obtaining a adaptive and trainable physical neural network.

McHardy, Nagahara and Kaler do not teach activating a subsequent neuron in response to firing an initial neuron of said plurality of neurons, thereby increasing a voltage of a pre-synaptic electrode of said neuron, which causes a refractory pulse thereof to decrease a voltage of a post-synaptic electrode associated with said neuron and thus provides an increased voltage between said pre-synaptic electrode of said preceding neurons and said post-synaptic electrode of said neuron.

Anderson teaches activating a subsequent neuron in response to firing an initial neuron of said plurality of neurons, thereby increasing a voltage of a pre-synaptic

electrode of said neuron, which causes a refractory pulse thereof to decrease a voltage of a post-synaptic electrode associated with said neuron and thus provides an increased voltage between said pre-synaptic electrode of said preceding neurons and said post-synaptic electrode of said neuron. (**Anderson,** abstract; Anderson discloses a refractory pulse which has the effect of increasing voltage to a pre-synaptic electrode to decreasing voltage to a post-synaptic electrode.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy, Nagahara and Kaler by being employing a refractory pulse as taught by Anderson to activating a subsequent neuron in response to firing an initial neuron of said plurality of neurons, thereby increasing a voltage of a pre-synaptic electrode of said neuron, which causes a refractory pulse thereof to decrease a voltage of a post-synaptic electrode associated with said neuron and thus provides an increased voltage between said pre-synaptic electrode of said preceding neurons and said post-synaptic electrode of said neuron.

For the purpose of imitating a biological system of a neural network as applicant by using an invention which parallels a cardiac pace maker.

Claim 7

McHardy and Nagahara do not teach firing and activating subsequent neurons thereof in succession in order to produce an increased frequency of said electric field between subsequent pre-synaptic and post-synaptic electrodes thereof, thereby causing an increase in an alignment of said plurality of nanoconnections and a decrease in an

electrode resistance between said subsequent pre-synaptic and post-synaptic electrodes thereof.

Kaler teaches firing and activating subsequent neurons thereof in succession in order to produce an increased frequency of said electric field between subsequent pre-synaptic and post-synaptic electrodes thereof, thereby causing an increase in an alignment of said plurality of nanoconnections and a decrease in an electrode resistance between said subsequent pre-synaptic and post-synaptic electrodes thereof. (**Kaler,** abstract; 'Nanoconnections is strengthened or weakened according to an application of said electric field' of applicant is equivalent to 'conductance and their thickness, conductivity, and fractal dimension can be controlled by varying the frequency and voltage of the applied field' of Kaler. By firing the neuron would have the parallel effect as the electric field does by increasing conductance and thickness.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy and Nagahara by being able to alter the thickness of the connection between the electrodes as taught by Kaler to have firing and activating subsequent neurons thereof in succession in order to produce an increased frequency of said electric field between subsequent pre-synaptic and post-synaptic electrodes thereof, thereby causing an increase in an alignment of said plurality of nanoconnections and a decrease in an electrode resistance between said subsequent pre-synaptic and post-synaptic electrodes thereof.

For the purpose of obtaining a adaptive and trainable physical neural network.

Claim 25

McHardy, Nagahara and Kaler do not teach wherein said pulse generation means comprises a refractory pulse generator for generating said at least one pulse.

Anderson teaches wherein said pulse generation means comprises a refractory pulse generator for generating said at least one pulse.(**Anderson,** C8:33-54, C12:20-39; 'Refractory pulse generator' of applicant is equivalent to 'refractory pulse generator' of Anderson. Cardiac pacer circuit makes at least one pulse) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy, Nagahara and Kaler by using a refractory pulses taught by Anderson to have wherein said pulse generation means comprises a refractory pulse generator for generating said at least one pulse.

For the purpose of using the feedback properties of a refractory pulse which parallels biology models

Claim 26

McHardy, Nagahara and Kaler do not teach wherein said at least one pulse comprises a refractory pulse.

Anderson teaches wherein said at least one pulse comprises a refractory pulse. (**Anderson,** C8:33-54, C12:20-39; 'Refractory pulse generator' of applicant is equivalent to 'refractory pulse generator' of Anderson.) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined

teachings of McHardy, Nagahara and Kaler by using a refractory pulse as taught by Anderson to have wherein said at least one pulse comprises a refractory pulse.

For the purpose of using the feedback properties of a refractory pulse which parallels biology models

Claim 27

McHardy teaches a connection network formed from said plurality of nanoconnections by applying said electrical field to said at least one pre-synaptic electrode and said at least one post synaptic electrode associated with said plurality of nanoconnections. (**McHardy,** abstract)

McHardy, Nagahara and Kaler do not teach where said pulse generation means comprises a refractory pulse generator for generating said at least one pulse and wherein said at least one pulse comprises a refractory pulse.

Anderson teaches where said pulse generation means comprises a refractory pulse generator for generating said at least one pulse and wherein said at least one pulse comprises a refractory pulse. (**Anderson,** C8:33-54, C12:20-39; 'Refractory pulse generator' of applicant is equivalent to 'refractory pulse generator' of Anderson. Cardiac pacer circuit makes at least one pulse) It would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify the combined teachings of McHardy, Nagahara and Kaler by using a refractory pulse as taught by Anderson to have where said pulse generation means comprises a refractory pulse

generator for generating said at least one pulse and wherein said at least one pulse comprises a refractory pulse.

For the purpose of using the feedback properties of a refractory pulse which parallels biology models

Response to Arguments

6. Applicant's arguments filed on February 15, 2007 for claims 1-3, 6, 7, 9-20, 23-27 have been fully considered but are not persuasive.

7. In reference to the Applicant's argument:

Applicant claims that there is not a summation circuit (p14).

Examiner's response:

Claim 19 states that an excitation level is based on 'a weighted sum of input signals received over respective nanoconnections.' Somehow these 'weighted sum of input signals' are generated in some physical manner due to previous arguments that the applicant's invention was a 'physical neural network. Figure 26 is a flow chart and not a physical design previously argued by the applicant. Office action stands.

8. In reference to the Applicant's argument:

Applicant deleted the term 'integrator' (p14) and replaced them with 'automatically summing' and 'comparing'.

Examiner's response:

'Automatically summing' and 'comparing' was rejected by 35 U.S.C. 112 above. Office action stands.

9. In reference to the Applicant's argument:

Applicant states that nanoconnections and nanoconductors are not utilized interchangeably.(p15, 16)

Examiner's response:

Examiner withdraws rejection. The Examiner notes on p41 of arguments made by the applicant that the terms nanoparticles and nanoconductors are equivalent. The statement in applicant's arguments on page 41 indicates that a gold ion is a nanoparticle. A plurality of nanoconductors will produce a plurality of nanoconnections, thus all claims remain rejected.

10. In reference to the Applicant's argument:

Applicant makes an argument about 'solution' and 'mixture', which uses a 'solvent'.(p17)

Examiner's response:

See 35 U.S.C. §112 rejection concerning definitions of 'solution' and 'mixture'.

Office action stands.

11. In reference to the Applicant's argument:

Applicant states that the invention is 'electromechanical'. (p32, 33, 40-45, 49, 53)

Examiner's response:

The word 'electromechanical' is not mentioned within the specification. In addition, the independent claims teach away from an electromechanical method. All independent claims state that 'nanoconnections that are not strengthened and thus not utilized by said artificial neural network are dissolved back into said dielectric liquid solution.' The key terms are 'solution' and 'dissolved back.' With 'solution' the components no longer have their individual properties and this is supported by 'dissolved back' which implies some component was initially dissolved into solution. Also 'dissolved back' implies that some component was participated out of solution in some manner in order to form the connection. Office action stands.

12. In reference to the Applicant's argument:

Applicant questions reason to combine references. (p18, 39, 46, 47, 49-51, 56-58, 62-64)

Examiner's response:

McHardy discloses a physical neural network in which nanoconnections can be made or 'dissolved' back into solution. Nagahara discloses nanoconnections can be made using carbon nanotubes. Kaler discloses the same topic as Nagahara with additional information regarding conduciveness and thickness in relation to varying frequency and voltage of electrical fields. Office action stands.

13. In reference to the Applicant's argument:

Applicant states that the references do not teach a dielectric liquid solution, (p15, 17, 22-24, 36-44, 46, 48, 51-56, 59-64)

Examiner's response:

Dielectric solution is described in Nagahara, p3827, C2:9-22) Office action stands.

14. In reference to the Applicant's argument:

Applicant claims that metal ions cannot be classified as nanoparticles/nanoconductors (p42)

Examiner's response:

Applicant makes the statement that metal ions cannot be classified as naonparticles/nanoconductors without any logical argument. Office action stands.

15. In reference to the Applicant's argument:

Applicant disagrees that Kaler supports claim 2. (p51-52)

Examiner's response:

Kaler is used in combination with McHardy and Nagahara. Office Action stands.

16. In reference to the Applicant's argument:

Applicant disagrees that McHardy supports claim 3. (p52-53)

Examiner's response:

McHardy states in the first sentence of the abstract a physical neural network. A physical neural network contains pre and post synaptic electrodes. Office Action stands.

17. In reference to the Applicant's argument:

Applicant disagrees that McHardy, Nagahara and Kaler do not teach claim 9. (p53-59)

Examiner's response:

McHardy, Nagahara and Kaler all teach the creation of nanoconnections using nanoparticles. McHardy, directly states the use for a neural network. All three can remove nanoconnections, thus creating an adaptive neural network. 'Feedback loops' are not mentioned in claim 9. Office Action stands.

18. In reference to the Applicant's argument:

Applicant disagrees that McHardy, Nagahara and Kaler do not teach claim 23. (p59-65)

Examiner's response:

Applicant states that Nagahara does not teach nanoconnections are strengthened or weakened according to an application of said electric field. Nagahara does teach nanoconnections are strengthened or weakened according to an application of said electric field. (**Nagahara,** p3827, C1:26-36) Thus Nagahara in combination with McHardy teaches an adaptive physical neural network. Office Action stands.

19. In reference to the Applicant's argument:

Applicant contests the use of Nugent as a reference. (p 66-67)

Examiner's response:

The Examiner withdraws the reference of Nugent. .

Examination Considerations

20. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has the full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

21. Examiner's Notes are provided to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and sprit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but link to prior art that one of ordinary skill in the art would find inherently appropriate.

22. Examiner's Opinion: Paragraphs 20 and 21 apply. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

24. Claims 1-3, 6, 7, 9-20, 23-27 are rejected.

Correspondence Information

25. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner Peter Coughlan, whose telephone number is (571) 272-5990. The Examiner can be reached on Monday through Friday from 7:15 a.m. to 3:45 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor David Vincent can be reached at (571) 272-3080. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

Hand delivered to:

Receptionist,

Customer Service Window,

Randolph Building,

401 Dulany Street,

Alexandria, Virginia 22313,

(located on the first floor of the south side of the Randolph Building);

or faxed to:

(571) 272-3150 (for formal communications intended for entry.)

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Peter Coughlan

5/1/2007

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